



Talking Algebra

MaTHink 2013

Madeleine Jetter
Department of Mathematics
CSU San Bernardino

The background features a stylized landscape with green mountain peaks at the top and bottom. A wide, textured band of yellow and orange occupies the center, resembling a sunset or a body of water. The text "Introduce Yourself" is centered within this band.

Introduce Yourself

Session Goal

To consider discourse strategies that:

- Develop targeted CCSS Standards for Mathematical Practice (SMPs)
- Build on number sense to develop algebraic thinking
- Build in formative assessment

Session Outline

- Watch and discuss an elementary number talk
- Try some number talks and algebra talks together
- Plan and share some number talks and algebra talks of your own

Number Talks

- Whole-class activities centered around mental math tasks
- Students explain and justify multiple solution strategies
- Teacher acts as facilitator
- Time required: 5-10 minutes

An Elementary Number Talk

How would you mentally calculate 32×15 ?

Try to find the product in two or more ways.

Students find 32×15

How does this teacher...

- Use wait time?
- Assess understanding?
- Record student thinking?
- Extend student thinking?

How do these students...

- Meet the Standards for Mathematical Practice?
- Show algebraic thinking?

What aspects of this activity would you use in your classroom? Which would you change?

Algebra Talks

At the secondary level, build on number sense to make connections to algebra.

Choose a topic and build a scaffolded “string” of mental math tasks

Percent String

Find and compare each pair of numbers. Be ready to explain how you arrived at your answers.

- 60% of 40 and 40% of 60
- 25% of 80 and 80% of 25
- 5% of 110 and 110% of 5
- $n\%$ of 100 and 100% of n

Describe the pattern. Will this hold every time? Why?

Equation String

Use only mental math to find a value for the variable that makes the equation true. Be prepared to explain your solution.

Equation String

- $x + 1 = 5$
- $x + \frac{1}{2} = 4\frac{1}{2}$
- $2x + \frac{1}{2} = 4\frac{1}{2}$
- $2(x + \frac{1}{2}) = 9$
- $5.5 = 3x + 2.5$

Guess my rule

Input	Output

Product String

Estimate each product first. Do not calculate until told to do so!

Product String

Estimate first.

- 19×21
- 99×101
- 199×201
- 39×41
- 299×301
- $(n - 1)(n + 1)$

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

Standards for Mathematical Practice

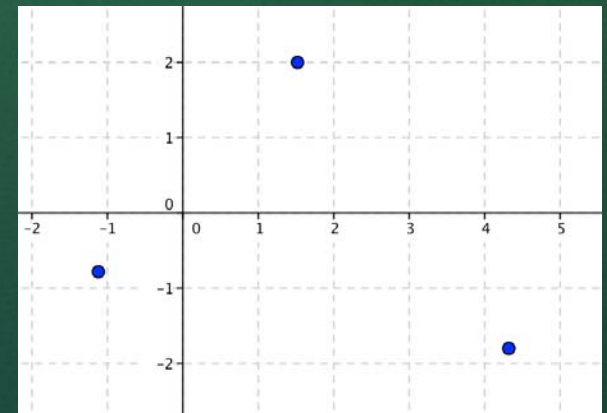
1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

Try it

- Choose a topic, skill or problem that you will teach in the next two weeks. This will be your *target*. You can also choose an item from the next slide.
- Choose a *starter* question. It should involve a prerequisite skill or topic. Make it accessible!
- How will you scaffold questions to build complexity towards the target?
- What tools will be available to students?
- What will you listen for in student responses?

Talk Starters and Targets

- Which is larger, $\frac{4}{7}$ or $\frac{3}{8}$?
- Find 13% of 30 mentally.
- I paid \$54 for an item that was discounted 40%. What was my savings?
- Write a numerical expression equal to 46. Find as many as you can.
- Write an equation equivalent to $x = 6$. Find as many as you can.
- Estimate the number of hairs on your head.
- $(x - 7)(x + 2) = 0$
- Simplify $\frac{x^2 + x}{x^2 + 2x + 1}$
- Use estimation. Suggest the equation of a parabola passing through the points below:

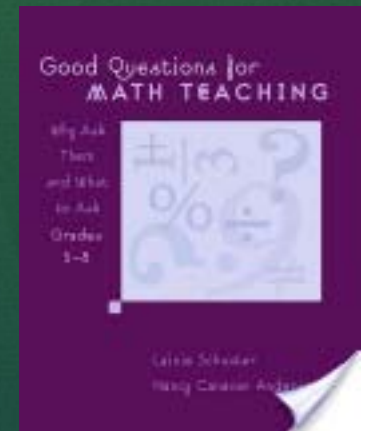
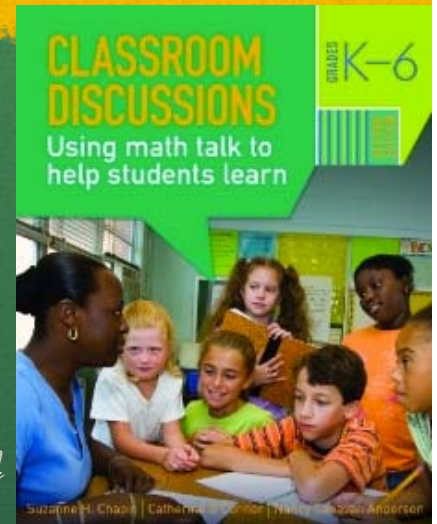


The background features a stylized landscape with green mountain peaks at the top and bottom. A wide, textured band of yellow and orange occupies the middle section, resembling a field or a sunset sky. The text "Your Turn" is centered within this band.

Your Turn

Recommended Resources

- Chapin, O'Connor and Anderson, *Classroom Discussions: Using Math Talk to Help Students Learn*. Math Solutions
- Anderson and Schuster, *Good Questions for Math Teaching: Why Ask Them and What to Ask, Grades 5-8*. Math Solutions
- Classroom Video Visits at www.insidemathematics.org



Thank you!

*Teachers are the key to changing the way students learn
mathematics*

-Dana and Yendol-Silva